

A REVIEW OF THE GENUS *MELANOCORIS* CHAMPION
WITH REMARKS ON DISTRIBUTION AND
HOST TREE ASSOCIATIONS
(HEMIPTERA: HETEROPTERA: ANTHOCORIDAE)

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Abstract.—The biogeographical and ecological characteristics of *Melanocoris pingreensis* (Drake and Harris), *M. nigricornis* Van Duzee, and *M. longirostris* Kelton are examined (Hemiptera: Heteroptera: Anthocoridae). A key to species, distribution maps and habitus figures are included. Although predaceous, each bug species usually is found on a particular species of conifer. Sometimes more than one bug species is on the same host species. Past migrations of these hosts, chiefly in response to climatic changes, may have influenced the present distribution of *Melanocoris*. The hosts included *P. contorta*, *P. flexilis*, *P. jeffreyi*, *P. monticola*, *P. ponderosa*, and *P. strombiformis*. Host species movements may have resulted in the species formation of *M. pingreensis*, presently known only from southeastern Wyoming and central Colorado. *Melanocoris nigricornis* occurs from southern British Columbia south through the Rocky Mountains to Colorado and south through the Cascade Mountains and Sierra Nevada Mountains to northern Baja California, Mexico. *Melanocoris longirostris* has a similar distribution but also occurs in southern Utah, Arizona, and southern New Mexico.

The different species of pines in western North America are widespread (Critchfield, 1957; Critchfield and Little, 1966) and many have a rich heteropteran fauna (e.g., Lattin and Stanton, 1992). We have sampled and collected the Anthocoridae on the different subspecies of lodgepole pine, *Pinus contorta* Dougl. ex Loud., *P. ponderosa* Dougl. ex Laws., and other associated conifer species (Lattin and Stanton, in press). Here we provide a review of the anthocorid genus *Melanocoris* Champion together with information on distribution and host plant associations of the included species.

Taxonomic considerations. Presently, four species are included in the genus *Melanocoris* Champion. They are found only in North America and only on coniferous trees. The type of the genus, *M. obovatus* Champion, was described in 1900 from the Los Altos region of Guatemala between 2,615 and 3,231 m (probably from pine) and is only known from this locale.

Van Duzee (1921) described *M. nigricornis* from the central and southern Sierra Nevada Mountains of California. It has been collected in northern Baja California, California, Oregon, Washington, southeastern British Columbia, northwestern Wyoming, and Colorado (Van Duzee, 1921; Anderson, 1962; Kelton and Anderson, 1962; Kelton, 1977, 1978; Henry, 1988). *Tetraphelps novitus*, described by Drake and Harris (1926) from Stonewall, Trinidad, and Estes Park, Colorado, was synonymized with *M. nigricornis* by Kelton and Anderson (1962).

Drake and Harris (1926) described *M. pingreensis* (as a species of *Tetraphelps*)

from Estes and Pingree Parks along the Front Range of the Rocky Mountains in northern Colorado. Kelton and Anderson (1962) transferred *pingreensis* to the genus *Melanocoris* Champion. Henry (1988) listed only Colorado in the catalog of Heteroptera. We have taken it in Estes Park, Larimer County, on Cucharas Pass in Las Animas County, Colorado, and in southeastern Wyoming near the Colorado border. It has not yet been reported from other localities nor has there been any additional information published on this species since it was described.

Melanocoris longirostris was described by Kelton (1977) from southeastern British Columbia, Colorado, Utah, New Mexico, and Arizona. We have examined other specimens from Oregon, Nevada, and California. Some morphological differences of these latter specimens suggest that they may represent another species. A revision of *Melanocoris* is needed to clarify the situation.

The species discussed here may be separated by the following key:

KEY TO *MELANOCORIS* SPECIES NORTH OF MEXICO

1. Dorsum dull, shagreened; pubescence long, especially on clavus and basal half of corium 2
- Dorsum shiny, polished; pubescence very short on clavus and basal half of corium *longirostris* Kelton (Fig. 2)
2. Length 2.5 mm; tip of rostrum reaches middle coxae *pingreensis* (Drake & Harris) (Fig. 1)
- Length 3.0 mm; tip of rostrum reaches anterior coxae *nigricornis* Van Duzee (Fig. 3)

Host plants. Species of *Melanocoris* usually occur on species of pines but have been taken from other species of conifers (Kelton, 1977, 1978). The allotype of *M. pingreensis*, a male, was collected on "pine" at Pingree Park, Colorado (Drake and Harris, 1926). While no specific host was cited for the Estes Park specimen, *Pinus ponderosa scopulorum* Engelm., the Rocky Mountain ponderosa pine, is the most common species in the area and is the likely host.

Kelton (1977, 1978) reported *M. longirostris* from British Columbia on *P. monticola* Dougl. ex D. Don; from Colorado on *P. flexilis* James, *Picea glauca* (Moench) Voss and *Abies lasiocarpa* (Hook.) Nutt.; and from Arizona on *Pinus ponderosa* (presumably *P. ponderosa scopulorum*) and *P. strombiformis* Engelm.

Van Duzee (1921) described *M. nigricornis* from the Sierra Nevada Mountains of California collected on an unnamed pine and on *Pinus jeffreyi* Grev. and Balf., and Anderson (1962) added *Pinus ponderosa* Dougl. ex Laws. and *P. contorta latifolia* Engelm. from British Columbia and Oregon [NOTE: This would be the nominate subspecies, *P. ponderosa ponderosa* (Conkle and Critchfield, 1988)]. Kelton (1978) recorded this species on *Pinus sylvestris* L. and *Picea engelmanni* Parry ex Engelm. from British Columbia.

Prey. No specific insect prey has been identified for *M. pingreensis*. Specimens of *M. longirostris* from Corvallis, Oregon were recorded as feeding on *Pineus* sp., a member of the Phylloxeridae (Hemiptera: Homoptera) (see specimens examined). Furniss and Carolin (1977) summarized the biology of some species of *Pineus*. Anderson (1962) found *M. nigricornis* associated with the aphids *Essigella fusca* G. and *P.* and *Cinara* sp., and with the pine needle scale, *Phenacaspis pinifoliae* (Fitch). He

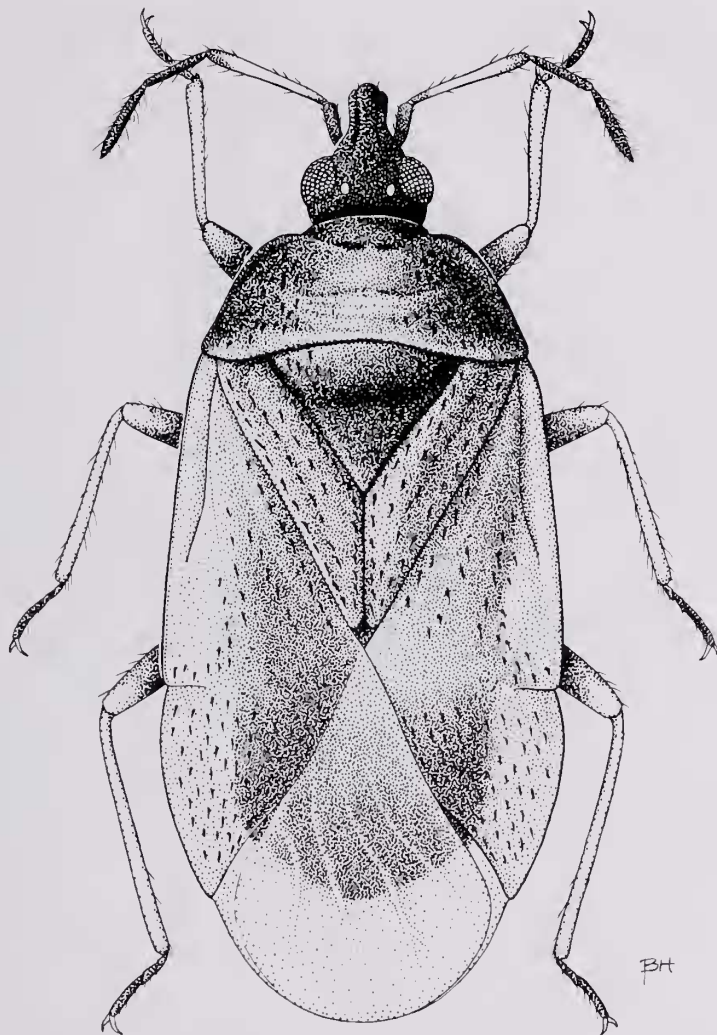


Fig. 1. *Melanocoris pingreensis* (Drake and Harris), female, Colo., Larimer Co., Estes Park YMCA Camp, ex *Pinus ponderosa* scapulorum.

reared this anthocorid in the laboratory on the filbert aphid, *Myzocallis coryli* (Goeze). Kelton (1978) reported a collection of *M. nigricornis* from *Pinus sylvestris* that had a heavy infestation of scale insects and from *P. contorta*, *P. ponderosa*, and *Picea engelmanni* that were infested with adelgids, aphids, and scale insects.

METHODS

Material presented here represents the results of our sampling on a regular basis from three sites in southeastern Wyoming in 1986 (see specimens examined). Spec-

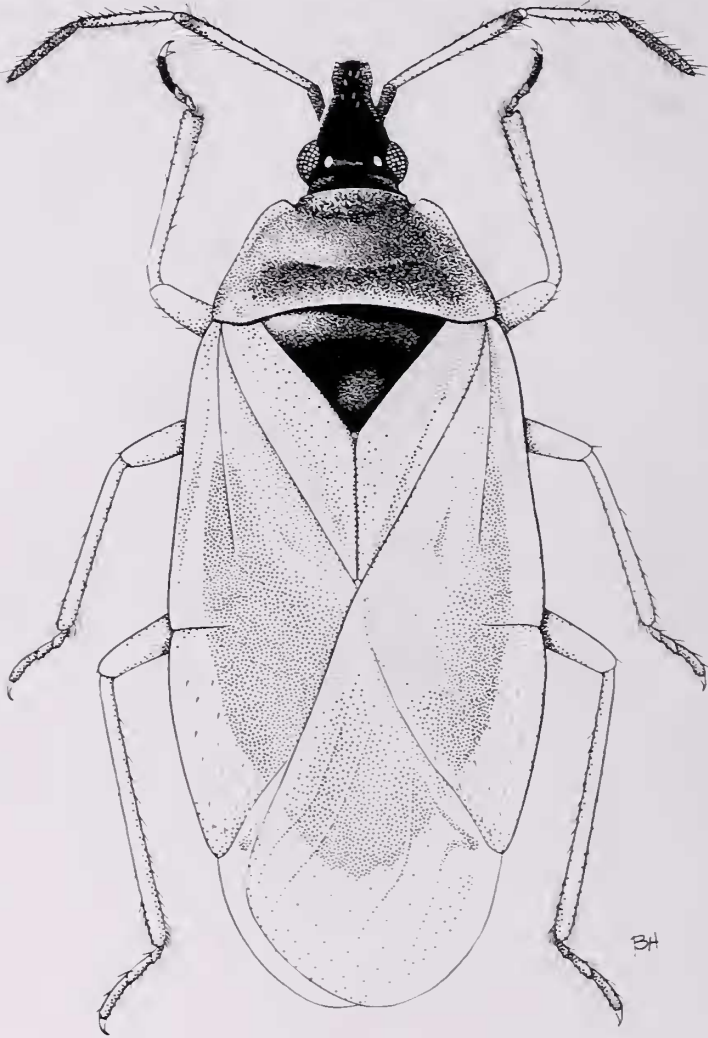


Fig. 2. *Melanocoris longirostris* Kelton, female, Colo., Larimer Co., Rocky Mt. Nat. Pk., ex *Pinus contorta latifolia*.

imens were collected by beating 20 branches onto a beating sheet where the insects were picked up with an aspirator. Branches continued to be beaten until no additional specimens appeared after ten individual beats. Additional collections were made in Colorado from the Estes Park region in 1990 and throughout Colorado in 1991 where special emphasis was placed upon collections from *P. contorta latifolia*, *P. ponderosa scopulorum*, and *P. aristata* Engelm. All specimens have been deposited in the Systematic Entomology Laboratory, Department of Entomology, Oregon State Univer-

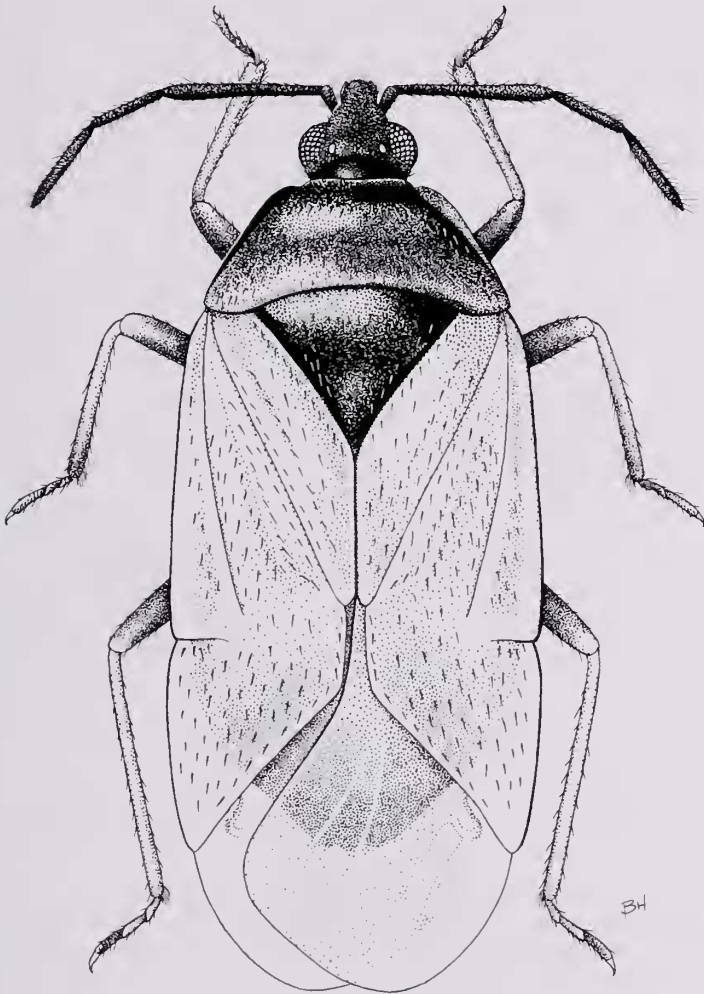


Fig. 3. *Melanocoris nigricornis* Van Duzee, female, Calif., Sierra Co., Tahoe Nat. For., FS Rd. 07, ex *Pinus contorta murrayana*.

sity, Corvallis. Records have been taken from the literature and from material in other collections where available.

RESULTS

We have collected specimens of *M. pingreensis* in southeastern Wyoming and parts of adjacent Colorado from *Pinus ponderosa scopulorum* (see specimens examined). At present, this species is known only from this area of the Rocky Mountains at about 2,500 m elevation and has the most restricted distribution of the three species (Map 1).



Map 1. Distribution of *Melanocoris pingreensis* (○) and *M. nigricornis* (●).

Melanocoris longirostris was described from southeastern British Columbia, Colorado, Arizona, New Mexico, and Utah (Map 2). We have seen specimens from southeastern Wyoming and adjacent Colorado, Oregon, Nevada, and California. Most of the Colorado localities are in that portion of the Rocky Mountains close to the Wyoming locale. The Arizona, New Mexico, and Utah records come from scattered, high elevation sites (e.g., Mt. Lemmon, San Francisco Mts., Cloudcroft, and Henry Mts. respectively). *Melanocoris longirostris* has not been taken in the Yellowstone Park region of northwestern Wyoming where the usual host plant, *P. contorta latifolia* Engelm., is common.

Melanocoris nigricornis has the broadest range (Map 1). It was common on *P. ponderosa scopulorum* at Estes Park, and Drake and Harris (1926) reported it from "pine" at the Stonewall and Trinidad localities. *Pinus ponderosa scopulorum* is the common pine at Stonewall. Specimens of *nigricornis* were taken in northwestern Wyoming in Grand Teton and Yellowstone National Park on *P. contorta latifolia*. The Central Wyoming basins represent a substantial gap in the distribution of pine in the Rocky Mountains. It is probable that *M. nigricornis* also occurs in suitable habitats between northwestern Wyoming and southeastern British Columbia. We



Map 2. Distribution of *Melanocoris longirostris* (●).

have examined specimens from southeastern British Columbia (Princeton) taken on *P. contorta latifolia*. *Melanocoris nigricornis* extends southward from British Columbia through Washington, Oregon and California to northern Baja California, Mexico and was taken chiefly on *P. contorta* although recorded from several other coniferous hosts as well (*Pinus* spp. and *Picea engelmanni*).

Specimens examined. *Melanocoris pingreensis*: Colorado, Larimer Co., Estes Park YMCA Camp, 6 km SW Estes Park, 2,465 m, R13W T4N Sec 4, 26 September 1990, *P. ponderosa scopulorum*, Lattin, 4 females, 2 males; Estes Park, east end, 2,338 m, 1 September 1991, *P. ponderosa scopulorum*, Lattin, 9 females; Las Animas Co., 4 km S Cucharas Pass, 2,892 m, 5 September 1991, *P. ponderosa scopulorum*, Lattin, 4 females, 1 male. Wyoming, Albany Co., Medicine Bow Nat. For., Happy Jack Road, 19 km E Laramie, 2,500 m, R72W T15N Sec 25, 26 July 1986, *P. ponderosa scopulorum* (10 trees pooled), Stanton, 1 female.

Melanocoris longirostris: California: San Bernardino Co., above W end Big Bear Lake, R1W + T2W NW¼ Sec 34, 2,215 m, 8 June 1989, champion *P. contorta murrayana* (Grev. and Balif.) Engelm., Lattin, 3 females. Colorado: Larimer Co., Rocky Mt. Nat. Pk., 8.1 km W Estes Park, R13W T5N Sec 19, 2,677 m, 29 September

1990, *P. contorta latifolia*, Lattin, 1 female; Las Animas Co., 4 km S Cucharas Pass, 2,892 m, 5 September 1991, *P. aristata*, Lattin, 1 female. Nevada: Washoe Co., Galena Cr., Mt. Rose, 14 June 1964, Smith and Baker, 1 female. Oregon: Benton Co., Corvallis, OSU campus, 28 August 1959, *P. monticola*, feeding on *Pineus* sp. Mitchell, 22 females, 17 males; 1 July 1988 (some teneral) *P. monticola*, Asquith, 1 female, 1 male; Klamath Co., base of Gearhart Mt., 7 June 1959, *P. contorta murrayana*, Schuh, 1 female; Lane Co., H. J. Andrews Exp. For., 18 km NE Blue River, 18 August 1988, *P. monticola*, Asquith, 5 females, 2 males, 2 5th instar nymphs. Wyoming: Albany Co., Medicine Bow Nat. For., Happy Jack Road, 19 km E Laramie, 2,500 m, R72W T15N Sec 25; 25 and 27 July 1986, *P. contorta latifolia*, Stanton, 3 females; 9 July 1986, *P. flexilis* (10 trees pooled), Stanton, 1 female.

Melanocoris nigricornis: CANADA: British Columbia; 19.5 km W Princeton, 1,169 m, 31 July 1957, *P. contorta*, 1 male. MEXICO: Baja California Norte, 90 km E San Telmo, 18 April 1979, *P. contorta murrayana*, Lightfoot, 4 females, 2 males. UNITED STATES: California: Fresno Co., Pioneer Basin, 13 km W Tom's Place, 3,400 m, 27 October 1959, Schlinger, 1 female, (UCR); Mono Co., June Lake, Hwy 158, 16 June 1989, *P. contorta murrayana*, Lattin, 3 females; Sierra Co., Tahoe Nat. For., FS Rd. 07, 28 km W Hwy 89, 2,092 m, 16 July 1987, *P. contorta murrayana*, DiGiulio, 1 female. Colorado: Larimer Co., Estes Park YMCA Camp, 6 km SW Estes Park, 2,465 m, R13W T4N Sec 4, 26 September 1990, *P. ponderosa scopulorum*, Lattin, 3 females, 1 male; Las Animas Co., 4 km S Cucharas Pass, 2,892 m, 5 September 1991, *P. ponderosa scopulorum*, Lattin, 1 female. Oregon: Deschutes Co., Three Crks. Mdw., 26 km S Sisters, 2,065 m, 1 September 1977, *P. contorta murrayana*, Lattin, 3 males; Three Crks. Lk., 28 km S Sisters, 2,100 m, 14 June 1990, *P. contorta murrayana*, Asquith and Lattin, 8 females; Black Butte Ranch, 12 km NW Sisters, 1,015 m, 24 March 1990, *P. sylvestris*, Lattin, 3 females, 3 males; Linn Co., Big Lake, 1,431 m, 1 October 1979, *P. contorta murrayana*, Lattin, 4 females. Washington: Kittitas Co., 8 km W, 5 km S of Cle Elum, 6 June 1970, Harris, 1 female. Wyoming: Park Co., Yellowstone Nat. Pk., 8 km S Tower Falls, 2,262 m, 17 September 1980, *P. contorta latifolia*, Lattin, 2 females; Teton Co., Grand Teton Nat. Pk., 2,123 m, 18 September 1980, *P. contorta latifolia*, Lattin, 3 males.

DISCUSSION

Host range. Although Anthocoridae are chiefly predaceous, they often show remarkable fidelity to given host plants, and in this case, the genus *Melanocoris* to coniferous trees. Elsewhere, we have reported 18 species of anthocorids representing 10 genera found on *P. contorta* (Lattin and Stanton, 1992). Although several were likely visitors from nearby vegetation, most occurred consistently on that tree species. Some Anthocoridae are known to feed upon plant materials besides being predaceous (Lattin and Stanton, 1992).

Melanocoris pingreensis is known only from *P. ponderosa scopulorum* and only from a restricted portion of this tree's range. *Melanocoris longirostris* is found on four species of pine and on *Picea glauca* and *Abies lasiocarpa* in the northern part of its range. *Melanocoris nigricornis* is found on four species of pines, including three subspecies of *P. contorta* and on *Picea engelmanni* in the northern portion of the bug's range. All three species of *Melanocoris* have been collected on *P. ponderosa*. *Melanocoris nigricornis* and *M. longirostris* have both been collected from *P. contorta*

latifolia and *P. c. murrayana* but only at two locales. Species overlap on specific hosts: *Melanocoris pingreensis* and *M. nigricornis* on *P. ponderosa scopulorum* in northern Colorado and *M. longirostris* and *M. nigricornis* or *P. contorta murrayana* in southern California. Such host association, combined with the very patchy distribution of some of the hosts, may result in speciation. It is interesting to note that both *M. pingreensis* and *M. nigricornis* were taken from the same tree in Estes Park in September, 1990. Detailed host data from specimens of *M. nigricornis* in that general area are scanty. It occurs on *Pinus contorta latifolia* in northwestern Wyoming but did not appear in our samples from this host in southeastern Wyoming, and was reported only from "pines" from Stonewall and Trinidad, Colorado (but see note earlier in this paper) (Drake and Harris, 1926). Information about the factors determining the occurrence and distribution of insects on these hosts will be helpful.

Geographical distribution. Thus far, *Melanocoris pingreensis* has the most limited geographical distribution and is known only from southeastern Wyoming in the Laramie Range east of Laramie, and in the Front Range and Sangre de Cristo Mountains of the Rocky Mountains of Colorado (see specimens examined). Recent collecting (1991) on this host in the mountains of central and western Colorado failed to produce *M. pingreensis* although it was collected at Estes Park and at Cucharas Pass (see specimens examined). The present distribution of *M. pingreensis* probably dates back to the post-Pleistocene with the increased isolation and fragmentation of the populations of its host plant. Because of the presumed antiquity of its host plant (see below), the speciation event of the bug might be considerably older. The dynamics of the vegetation in this region of the Rocky Mountains during the Pleistocene have been the subject of considerable interest and research (see for example Short, 1985; Fall, 1985; Adams, 1983; Wells, 1963; Wells, 1970; Jacobs, 1985).

Hengeveld (1989) documented the movement of different elements of the biota across the landscape. In the case of *Pinus ponderosa*, the use of fossil material from the Pleistocene deposits and post-Pleistocene pack-rat middens has provided information about the presence and movement of some parts of the flora (J. L. Betancourt, pers. comm. 1991). Certainly, *P. ponderosa* has been a mobile species, but its fossil record is still imperfectly known (Martin, 1963; Wells, 1970; Cole, 1983; Van Devender and Toolin, 1983; Van Devender, 1990a, b).

Conkle and Critchfield (1988) outlined the genetic variation throughout the range and likely evolutionary history of *Pinus ponderosa*. Citing Axelrod (1986), they reported a cone fragment attributed to *P. ponderosa scopulorum* from Creede, Colorado, dated at 26.5 millions years. According to these authors, the geological history of *P. ponderosa* may extend back 50 million years. Linhart (1988) provided information on the genetic variability of *P. ponderosa scopulorum* and discussed variation in space and time and the interactions between the host tree and different organisms. He cited dwarf mistletoe (*Arceuthobium*) and bark beetles (*Dendroctonus* spp.) as examples of species-specific associations with the tree.

Conkle and Critchfield thought that the most likely origin of modern ponderosa pine was in Mexico and resulted in two different varieties—the western form found in southern California (Cole, 1983) and the eastern form found in the Southwest (Van Devender and Toolin, 1983; Van Devender, 1990a, b), the former derived from the west coast and the latter from the central Mexico populations.

The evidence from pack-rat middens dated at 40,000–50,000 years indicated pon-

derosa pine was not present in southwestern United States until *after* the last glacial epoch ($\pm 10,500$ years) (Van Devender, 1987) and Conkle and Critchfield concluded that although ponderosa pine had an extensive geographic range during warm interglacial times, it may have been restricted to only a few refugia during full-glacial periods. If so, then such refugia may have provided the isolating conditions that resulted in allopatric speciation of insects associated with the tree—e.g., *Melanocoris pingreensis*. Obviously, with such a long geological history, earlier events may have resulted in such speciation.

Cronkle and Critchfield (1988) also suggested that ponderosa pines are very recent colonizers in much of their present range, perhaps within the last 6,000–8,000 years. According to these authors—“If significant climatic warming during the Xerothermic period 3,000 to 8,500 years ago was a primary reason for ponderosa’s massive range extensions, the existence of races could trace to a few, relatively restricted progenitor populations.” Wells (1970) reported macrofossils of *P. ponderosa scopularum*, dated at 1860 and 4060 B.P. from the southwest corner of the Laramie Basin, Wyoming, where the tree still exists. Elliott-Fisk, Adkins, and Spaulding (1983) provided a critical review of the work of Wells (1970) and suggested that the earlier forest/woodlands were confined to sandstone outcrops as outliers of the montane forest of Medicine Bow Mountains. Collecting on *P. ponderosa scopularum* on the scarps of eastern Wyoming, as well as other widely scattered and isolated populations of *P. p. scopularum* from throughout the southwest, will likely yield distribution records of interest and help clarify some distributional aspects.

According to Conkle and Critchfield (1988), there are two major races of *P. ponderosa scopularum*: the Rocky Mountain race found today from southern Utah and Colorado north to Wyoming, Montana and North and South Dakota; and a southern race found in southern Utah and Colorado, Arizona and New Mexico. The concept of race used by Conkle and Critchfield appears very similar to the concept of subspecies used elsewhere.

Hawksworth and Shaw (1988), discussing diseases of ponderosa pine, included a map of the distribution of the two major species of dwarf mistletoe found on ponderosa pine—*Arceuthobium campylopodum* Engelm. on *P. p. ponderosa* and *A. vaginatum cryptopodum* (Engelm.) Hawks. and Wiens on *P. p. scopularum*. Of special interest is the fact that the species of mistletoe found on *P. p. scopularum* occurs only in the southern portion of the tree’s range suggesting that the tree has expanded its range more rapidly than the parasite. Hawksworth and Wiens (1984) reported that the southern portion of the range of *A. v. cryptopodum* extended south to Chihuahua and Coahuila, Mexico where it is found on several other species of *Pinus*. There are parallels between the movement of this plant parasite of ponderosa pine and the movement of some of the associated insects, i.e., anthocorids.

Steele (1988) outlined the ecological relations of ponderosa pine and discussed the differences in the environment occupied by both subspecies of the tree and the other plants associated with them. The map in his paper illustrated the extensive range presently occupied by *P. ponderosa*. The study of other groups of organisms associated with ponderosa pine may shed light on the complex history of this tree species.

Finally, Mexico almost certainly holds additional species of *Melanocoris*. Thorough collecting with close attention to host plant information and locale will clarify our knowledge of this genus of Anthocoridae.

CONCLUSIONS

The patterns of distribution of three species of *Melanocoris* are the product of close association with several host tree species or subspecies. The widespread distribution of *Pinus ponderosa*, *Pinus contorta*, and *P. flexilis* has provided habitats for species of *Melanocoris*. Since the host plants do not offer a continuous habitat, but rather a widespread, highly patchy habitat, the occurrence of the anthocorids in widely separated localities suggests either extraordinary dispersal capabilities or close association, perhaps coevolution, with that host tree in geological time as the range of the tree expanded and contracted in response to pre- and post-Pleistocene events (C. Whitlock, pers. comm., 1991). The latter explanation seems more likely.

The fact that within the total range of the bug species there is often a regional association with different host trees—i.e., *Pinus monticola*, *Pinus contorta*, and *P. ponderosa* for *Melanocoris longirostris* (Map 2), or *Pinus ponderosa* and *P. contorta* for *M. nigricornis* (Map 1), and *P. ponderosa scopulorum* for *M. pingreensis* (Map 1)—suggests past constrictions and confinements on different host trees resulting in present day distributions. The restricted distribution of *M. pingreensis* suggests long isolation on some subset of *Pinus ponderosa*, or, less likely, it may represent the remnant of a once more widespread distribution. The presence of all three species of *Melanocoris* in the vicinity of Estes Park, Colorado provides a unique opportunity for biological and ecological studies.

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